Additional Investigation of AOC-092, Building 4-20 Addition

1/20/2006

RL# 20229 1 of 1 Loc: RTN 6-2

Description

Additional Investigation of AOC-092, Building 4-20 Addition

Supports

Corrective Action

Contents

Custodian	*Date Added*
Remediation	1/23/2006

Geomatrix

Memorandum

TO:	Byung Maeng, Ecology Carl Bach, Boeing	**DATE:**	January 20, 2006
FROM:	Dave Haddock, Geomatrix	**PROJ. NO.:**	8888.002
CC:	Ray Power, Boeing	**PROJ. NAME:**	Boeing Renton Plant, Renton, Washington

SUBJECT: **Additional Investigation of AOC-092, Building 4-20 Addition**

INTRODUCTION

This memorandum summarizes the specific steps that were taken at the Boeing Renton Plant in Renton, Washington, for additional investigational work for area AOC-092, located on the north end of the site, on the east side of Building 4-20. The objective was to further investigate whether or not contamination related to AOC-092 extends underneath the building. This was accomplished by collecting six soil samples at the water table (approximately 4-feet below ground surface (bgs)), and six grab groundwater samples.

SITE BACKGROUND AND PREVIOUS INVESTIGATIONS

AOC-092 is a hydrocarbon (total petroleum hydrocarbons (TPH) as gasoline) release location located just north of the Building 4-20 Addition, along the east side of Building 4-20 (Figure 1). This area was historically and is currently used for employee parking and near temporary outdoor storage of airplane parts.

TPH in the gasoline range was found at this AOC during trenching activities related to replacement of a fire protection water line in 2001. One grab sample was collected, but no impacted soil was removed at the time of the original fire water line excavation from this area due to structural concerns regarding the building foundation (Boeing, 2001). Later in 2001, as part of the post-Remedial Investigation (RI) site investigation, five direct push borings (PP073 to PP077) were installed in the source area. TPH as gasoline and associated compounds were found to be present in site soils and groundwater exceeding both the preliminary cleanup levels from the RI and cleanup levels from the Feasibility Study Work Plan (Geomatrix, 2004). The

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maximum gasoline concentration in soil in the source area was 22,000 mg/kg. Gasoline and benzene-affected groundwater was found at four of the direct push groundwater sampling locations, with gasoline and benzene at concentrations of up to 8,700 and 4.8 µg/L, respectively (Weston, 2001).

Due to facility improvements, the concrete slab floor inside Building 4-20 was removed and replaced in November 2005 in the vicinity of AOC-092. The portion of the floor that was initially removed is located to the northwest of the Building 4-20 Addition inside Building 4-20 (see Figure 1). In order to determine whether the affected soil related to the AOC-092 release extended underneath Building 4-20 in the area of slab removal, soil and groundwater samples were collected from six locations northwest of the known source area at AOC-092 via direct push borings.

SAMPLING AND ANALYSIS

This section describes the approach that was used to complete the November 2005 investigation at AOC-092. Figure 1 shows the location of AOC-092, and the approximate sampling locations.

Direct Push Sampling

On November 11, 2005, Geomatrix oversaw completion of six direct push borings (PP154 through PP159) inside Building 4-20. Drilling was completed with a direct push drill rig operated by Cascade Drilling of Woodinville, Washington. The borings were completed within the area of concrete slab removal inside the building, as shown on Figure 1, to further define the lithology, and the nature and extent of TPH gasoline range and benzene, toluene, ethylbenzene, and xylene (BTEX) in soil and groundwater.

Discrete soil cores were collected from each boring for the purpose of describing the subsurface soils and collecting samples for laboratory analysis. Soil samples were collected from each boring from the depth of the approximate water table. Field screening of cores was performed with a flame-ionization detector (FID). If soil contamination was apparent based on field observations, then a grab groundwater sample was collected through 4-foot stainless steel 1-inch

diameter temporary wells screened across the water table from approximately 4 to 8 feet bgs. The applicable field observations that determined if groundwater sampling was necessary included the presence of a hydrocarbon sheen, flame ionization detector (FID) response, or odor. Soil and groundwater samples were collected in laboratory-supplied sample jars, labeled, and stored in an ice-cooled chest for transport.

The soil descriptions, including FID readings, were recorded by Geomatrix staff on boring logs for each boring; copies of the boring logs are provided in Attachment A.

Field Procedures

Sample collection was conducted in accordance with the Ecology-approved RI Work Plan (Weston, 1998) as subsequently amended, which includes field methods for sample collection, sample designation, equipment decontamination, and documentation. It should be noted that peristaltic pumps were used to collect groundwater samples from the temporary wells. Table 1 lists the specific samples collected from each location.

Analytical Methods

The samples were analyzed by Analytical Resources Incorporated of Tukwila, Washington. All soil and groundwater samples collected were analyzed for TPH gasoline range using Method NWTPH-G and BTEX using EPA Method 8021.

Quality Control

The quality assurance and quality control (QA/QC) procedures outlined in the Quality Assurance Project Plan (QAPP) presented in Section 6.0 of the approved RI Work Plan were followed for confirmation sampling performed during this project. All analytical data generated by the laboratory were reviewed in accordance with the QAPP. The data validation reports and the analytical data are presented in Attachment B.

Waste Management

Waste management followed the guidelines described in the approved RI Work Plan (Weston, 1998). Soil cuttings, decontamination water, and groundwater from the push probe sampling activities were managed by Boeing.

RESULTS

Soil and groundwater results are summarized in Tables 1 and 2. The Ecology-approved Feasibility Study Work Plan (Geomatrix, 2004) cleanup levels were used for evaluation of soil and groundwater results.

All soil sample results were non-detect for TPH gasoline range and BTEX. Therefore, no affected soil was identified at the locations sampled.

Benzene was the only compound detected in groundwater samples that exceeded the cleanup level of 1.2 µg/L. Benzene concentrations exceed cleanup levels at four of the six boring locations with the highest concentration (5.9 µg/L) detected at PP154, the southwestern-most location. This benzene level is consistent with the benzene levels observed in groundwater during the 2001 investigation.

RECOMMENDATIONS

AOC-092 was previously evaluated as part of the Draft Feasibility Study (FS) submitted to Ecology in November 2004. At that time, with the data that existed, source area excavation followed by enhanced bioremediation and monitored attenuation was selected as the preferred alternative. When the FS is finalized, these additional data will be considered and reevaluated to see if any changes to the preferred remedy should be implemented. If changes are identified, they will be incorporated into the final FS.

REFERENCES

The Boeing Company (Boeing), 2001, Letter from Boeing to Washington State Department of Ecology, Newly Discovered Potential Release, Building 4-20, Column S4, Exterior, Boeing Commercial Aircraft Group, Renton Plant, WAD 009 262 171 RCRA Corrective Action Agreed Order No. DE 97HZ-N233, March 27.

Geomatrix Consultants, Inc., 2004, Final Feasibility Study Work Plan: Prepared for the Boeing Company, June.

Roy F. Weston (Weston), 1998, Remedial Investigation Work Plan: Prepared for The Boeing Company Renton Plant, Seattle, Washington, April.

Weston, 2001, Building 4-20 Exterior, Column S-4 (AOC-092) Soil and Groundwater Sampling Report: Prepared for The Boeing Company, Boeing Shared Services Group, Energy and Environmental Affairs, August 30.

TABLES

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TABLE 1

SOIL CLEANUP/COMPARISON LEVELS AND RESULTS FOR SELECTED CONSTITUENTS OF CONCERN
AOC-092 INTERIM ACTION

Boeing Renton Facility
Renton, Washington

Constituent	FS-SB-PP154-0040 11/11/2005	FS-SB-PP156-0040 11/11/2005	FS-SB-PP156-1040 11/11/2005	FS-SB-PP155-0040 11/11/2005	FS-SB-PP157-0040 11/11/2005	FS-SB-PP158-0040 11/11/2005	FS-SB-PP159-0040 11/11/2005
VOCs in mg/kg							
Benzene	<0.018 U	<0.021 U	<0.020 U	<0.017 U	<0.020 U	<0.014 U	<0.017 U
Toluene	<0.035 U	<0.042 U	<0.040 U	<0.034 U	<0.040 U	<0.029 U	<0.034 U
Ethylbenzene	<0.035 U	<0.042 U	<0.040 U	<0.034 U	<0.040 U	<0.029 U	<0.034 U
m, p-Xylene	<0.070 U	<0.083 U	<0.079 U	<0.068 U	<0.080 U	<0.057 U	<0.067 U
o-Xylene	<0.035 U	<0.042 U	<0.040 U	<0.034 U	<0.040 U	<0.029 U	<0.034 U
Xylenes, Total	<0.140 U	<0.170 U	<0.160 U	<0.140 U	<0.160 U	<0.110 U	<0.130 U
Petroleum Hydrocarbons in mg/kg							
TPH-gasoline	<7.0 U	<8.3 U	<7.9 U	<6.8 U	<8.0 U	<5.7 U	<6.7 U

1. U = the analyte was not detected at value to the left which is the detection limit

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TABLE 2

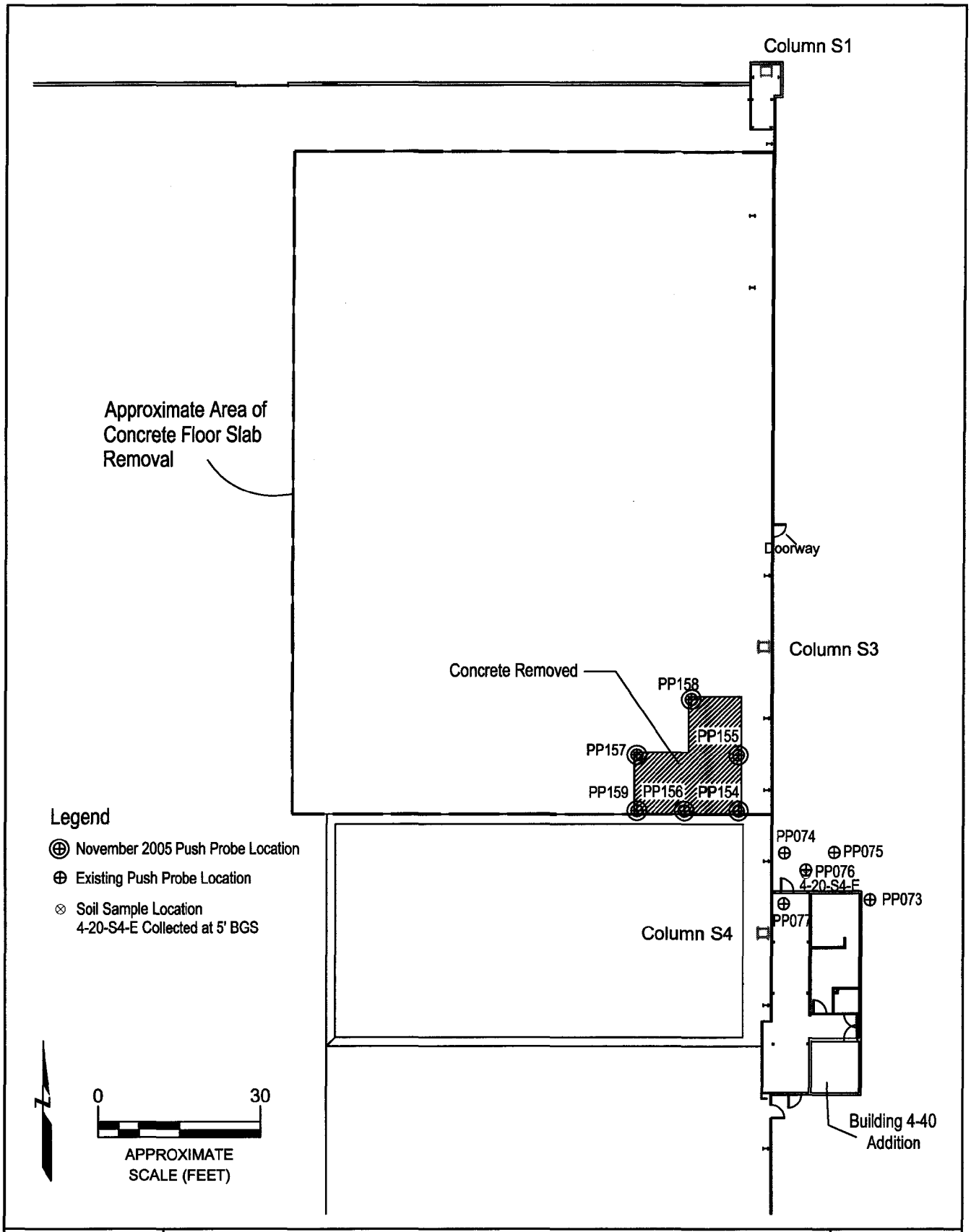
WATER CLEANUP/COMPARISON LEVELS AND RESULTS FOR SELECTED CONSTITUENTS OF CONCERN
AOC-092 INTERIM ACTION

Boeing Renton Facility
Renton, Washington

Constituent	FSWP Cleanup Level	FS-SB-PP154-0080 11/11/2005	FS-SB-PP156-0080 11/11/2005	FS-SB-PP156-1080 11/11/2005	FS-SB-PP155-0080 11/11/2005	FS-SB-PP157-0080 11/11/2005	FS-SB-PP158-0080 11/11/2005	FS-SB-PP159-0080 11/11/2005
VOCs µg/L								
Benzene	1.2	**5.9**	**2.1**	**2.1**	<1.0 U[1]	**1.4**	**2.0**	<1.0 U
Toluene	1000	<1.0 U	<1.0 U	<1.0 U	1.1	<1.0 U	<1.0 U	<1.0 U
Ethylbenzene	700[2]	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
m, p-Xylene	1000[2]	1.4	<1.0 U	<1.0 U	2.0	<1.0 U	<1.0 U	<1.0 U
o-Xylene	1000[2]	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U
Xylenes, Total	1000[2]	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
Petroleum Hydrocarbons mg/L								
TPH-gasoline [3]	0.8	0.27	<0.25 U	<0.25 U	0.35	<0.25 U	<0.25 U	<0.25 U

1. U = the analyte was not detected at value to the left
   which is the detection limit.
2. No cleanup value estabilised in the FSWP; this value is the MTCA Method A cleanup level.
3. Cleanup level for TPH-G *without* Benzene is 100 mg/kg.

FIGURES



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AOC-092 SAMPLING LOCATIONS
NOVEMBER 2005
Boeing Renton Facility
Renton, Washington

Project No. 8888

Figure 1

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ATTACHMENT A

Boring Logs

PROJECT: BOEING RENTON AOC-092 Renton, Washington				**Boring Log Explanation**	
BORING LOCATION:				ELEVATION AND DATUM:	
DRILLING CONTRACTOR:				DATE STARTED:	DATE FINISHED:
DRILLING METHOD:				TOTAL DEPTH (ft.):	MEASURING POINT:
DRILLING EQUIPMENT:				DEPTH TO WATER / FIRST / COMPL. / 24 HRS	
SAMPLING METHOD:				LOGGED BY:	
HAMMER WEIGHT:	DROP:			RESPONSIBLE PROFESSIONAL:	REG NO

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast density. structure, cementation, react w/HCl, geo. inter Surface Elevation:	REMARKS
1					Notes	
2					1 Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."	
3					2. Soil color described according to Munsell Color Chart	
4					3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions.	
5					4 Solid lines represent approximate boundaries observed within sample intervals.	
6					5. OVM = organic vapor meter, reading in volumetric parts per million.	
7					6. Odor, if noted is subjective and not necessarily indicative of specific compounds or concentrations.	
8					7 NA = Not applicable.	
9	FS-SB-PP154-0085				8 ND = No data.	
10					Grab soil sample.	
11					Interval of recovered soil collected with drive sampler.	
12					Interval of no recovery	
13	FS-SB-PP154-0130				Sample collected for chemical analysis and sample identification	
14						
15						

KEYFORM (REV. 7/99)

PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP154**
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 11/11/05 / DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft): FIRST 4.0 / COMPL NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long / REG. NO L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo inter. Surface Elevation: Not surveyed	REMARKS
1				0.6	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine sand, 5% nonplastic fines	
2						OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3	FS-SB-PP154-0040				SILT (ML)	
4				82		
5				454	POORLY GRADED SAND with SILT (SP-SM): very dark gray (10YR 3/1), wet, 90% fine sand, 10% nonplastic fines	Grab groundwater sample FS-GW-PP154-0080 collected through 1-inch OD stainless steel screen (0.010" slot) from 4 to 8 feet bgs.
6					SILTY SAND (SM): very dark gray (10YR 3/1), wet, 80% fine sand, 20% nonplastic fines, root fragments throughout	
7					SILT (ML) wood fragment	
8				5.3	Bottom of boring at 8.0 feet.	Borehole abandoned with hydrated medium bentonite chips to ground surface.
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PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP155**
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 11/11/05 / DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft) FIRST: 4.0 / COMPL: NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long / REG NO. L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast density, structure, cementation, react. w/HCl, geo inter Surface Elevation: Not surveyed	REMARKS
0	FS-SB-PP155-0040			0.7	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine to medium sand, 5% nonplastic fines	
1						
2				1.6		OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3						
4				70	SILTY SAND (SM): very dark gray (10YR 3/1), wet, 85% fine to medium sand, 15% nonplastic fines	
5				346	SILT (ML)	Grab groundwater sample FS-GW-PP155-0080 collected through 1-inch OD stainless steel screen (0.010" slot) from 4 to 8 feet bgs.
6				114		
7						
8				7.6	SILT (ML): very dark gray (10YR 3/1), moist, 95% fines, 5% fine sand, low plasticity, firm Bottom of boring at 8.0 feet.	Borehole abandoned with hydrated medium bentonite chips to ground surface.
9						
10						
11						
12						
13						
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15						

PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP156**	
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed; datum is ground surface	
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 11/11/05	DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0	MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft) FIRST: 4.0	COMPL: NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long	REG. NO L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist. % by wt., plast density, structure. cementation, react w/HCl, geo inter Surface Elevation: Not surveyed	REMARKS
0	FS-SB-PP156-0040			0.8	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine sand, 5% nonplastic fines	
1						
2				0.4		OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3						
4				56	ML wood fragments	
				282	POORLY GRADED SAND with SILT (SP-SM): very dark gray (10YR 3/1), wet, 90% fine sand, 10% nonplastic fines	
5						Grab groundwater sample FS-GW-PP156-0080 collected through 1-inch OD stainless steel screen (0.010" slot) from 4 to 8 feet bgs
6				118		
7					SILTY SAND (SM): very dark gray (10YR 3/1), wet, 80% fine sand, 20% nonplastic fines, root fragments throughout	
				101		
8					Bottom of boring at 8.0 feet	Borehole abandoned with hydrated medium bentonite chips to ground surface.
9						
10						
11						
12						
13						
14						
15						

PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP157**
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed, datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 11/11/05 / DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft.) FIRST: 4.0 / COMPL: NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long / REG. NO: L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast density, structure, cementation, react w/HCl, geo inter Surface Elevation: Not surveyed	REMARKS
0	FS-SB-PP157-0040			97	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine to medium sand, 5% nonplastic fines	
1						
2				07		OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3					rust colored	
4				24 2	SILTY SAND (SM): very dark gray (10YR 3/1), wet, 85% fine to medium sand, 15% nonplastic fines	
5				238		Grab groundwater sample FS-GW-PP157-0080 collected through 1-inch OD stainless steel screen (0 010" slot) from 4 to 8 feet bgs
6				1300		
7						
8				101	SILT (ML): very dark gray (10YR 3/1), moist, 95% fines, 5% fine sand, low plasticity, firm Bottom of boring at 8 0 feet	Borehole abandoned with hydrated medium bentonite chips to ground surface
9						
10						
11						
12						
13						
14						
15						

OAKBOREV (REV. 3/00)

PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP158**
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc.	DATE STARTED: 11/11/05 / DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft): FIRST 4.0 / COMPL. NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long / REG NO L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist, % by wt., plast density. structure. cementation, react w/HCl, geo inter	REMARKS
					Surface Elevation: Not surveyed	
1	FS-SB-PP158-0040			0.8	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine to medium sand, 5% nonplastic fines	
2				1.3		OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3						
4				165	rust colored SILTY SAND (SM): very dark gray (10YR 3/1), wet, 80% fine to medium sand, 20% nonplastic fines	
5				1200		Grab groundwater sample FS-GW-PP158-0080 collected through 1-inch OD stainless steel screen (0.010" slot) from 4 to 8 feet bgs
6				47		
7					wood fragment	
8				56	SILT (ML): very dark gray (10YR 3/1), moist, 95% fines, 5% fine sand, low plasticity, firm Bottom of boring at 8.0 feet.	Borehole abandoned with hydrated medium bentonite chips to ground surface.
9						
10						
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12						
13						
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15						

OAKBOREV (REV. 3/00)

PROJECT: BOEING RENTON AOC-092 Renton, Washington	**Log of Boring No. PP159**
BORING LOCATION:	ELEVATION AND DATUM: Not surveyed; datum is ground surface
DRILLING CONTRACTOR: Cascade Drilling, Inc	DATE STARTED: 11/11/05 / DATE FINISHED: 11/11/05
DRILLING METHOD: Direct push	TOTAL DEPTH (ft): 8.0 / MEASURING POINT: Ground surface
DRILLING EQUIPMENT: Custom Probe Rig	DEPTH TO WATER (ft): FIRST 4.0 / COMPL NA
SAMPLING METHOD: Geoprobe macro-core sampler [4' x 2"]	LOGGED BY: T. Gray
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: J. Long / REG NO L.Hg. 1354

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM READING (ppm)	DESCRIPTION NAME (USCS): color, moist. % by wt., plast density, structure, cementation, react w/HCl, geo inter. Surface Elevation: Not surveyed	REMARKS
0	FS-SB-PP159-0040			0	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), dry, 95% fine to medium sand, 5% nonplastic fines	
1						
2				0 5		OVM = PhotoVac MicroFID calibrated with 500 ppm methane
3						
4				135	POORLY GRADED SAND with SILT (SP-SM): very dark gray (10YR 3/1), dry, 90% fine to medium sand, 10% nonplastic fines wet	
5				2312		
6				116	SILTY SAND (SM): very dark gray (10YR 3/1), wet, 80% fine to medium sand, 20% nonplastic fines	Grab groundwater sample FS-GW-PP159-0080 collected through 1-inch OD stainless steel screen (0.010" slot) from 4 to 8 feet bgs
7						
8				473	SILT (ML): very dark gray (10YR 3/1), moist, 95% fines, 5% fine sand, low plasticity, firm Bottom of boring at 8 0 feet.	Borehole abandoned with hydrated medium bentonite chips to ground surface
9						
10						
11						
12						
13						
14						
15						

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ATTACHMENT B

Data Validation Reports and Analytical Data

Geomatrix

Memorandum

TO:	Dave Haddock, Project Manager	**DATE:**	December 20, 2005
FROM:	Crystal Neirby	**PROJ. NO.:**	8888
CC:	Project File	**PROJ. NAME:**	Boeing Renton, AOC-092
SUBJECT:	Summary Data Quality Review November 2005 Boeing Renton Soil Sampling (AOC-092) ARI SDG: IT11		

This memo presents the summary data quality review of six primary soil samples, one soil field duplicate, six primary water samples, one water field duplicate, and one trip blank sample collected November 11, 2005. The samples were submitted to Analytical Resources, Inc. (ARI), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Tukwila, Washington. The samples were analyzed for the following:

- Benzene, ethylbenzene, toluene, and xylenes (BETX) by EPA Method 8021
- TPH as gasoline by Ecology Method NWTPH-Gx

The samples and the analyses conducted on the samples are listed in the table below.

Sample ID	Laboratory Sample ID	Requested Analyses
FS-SB-PP154-0040	IT11A	BETX, TPH-G
FS-GW-PP154-0080	IT11H	BETX, TPH-G
FS-SB-PP156-0040	IT11B	BETX, TPH-G
FS-SB-PP156-1040	IT11C	BETX, TPH-G
FS-GW-PP156-0080	IT11I	BETX, TPH-G
FS-GW-PP156-1080	IT11J	BETX, TPH-G
FS-SB-PP155-0040	IT11D	BETX, TPH-G
FS-GW-PP155-0080	IT11K	BETX, TPH-G
FS-SB-PP157-0040	IT11E	BETX, TPH-G
FS-GW-PP157-0080	IT11L	BETX, TPH-G
FS-SB-PP158-0040	IT11F	BETX, TPH-G
FS-GW-PP158-0080	IT11M	BETX, TPH-G
FS-SB-PP159-0040	IT11G	BETX, TPH-G
FS-GW-PP159-0080	IT11N	BETX, TPH-G
Trip Blank	IT11O	BETX, TPH-G

Data were reviewed in accordance with the appropriate method procedures and criteria documented in the *Quality Assurance Project Plan (QAPP), Section 6.0* of the *Remedial*

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Investigation Work Plan (RIWP), for the Boeing-Renton Plant, Renton, Washington, April 1999. The control limits provided in the QAPP are advisory limits; therefore, the most current control limits provided by the laboratory were used to evaluate the quality control data. In cases where the laboratory did not track limits for an analyte, the limits in the QAPP were used.

Hold times, method/trip blanks, surrogate recoveries, laboratory control samples, matrix spike/matrix spike duplicates, and reporting limits were reviewed where available to assess compliance with applicable methods. If qualification was required, data were qualified based on the definitions and use of qualifying flags outlined in the EPA documents *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review,* October 1999.

Samples were received by ARI on November 11, 2005. The cooler temperatures were within the acceptable temperature range of 4 ± 2°C. There were no other discrepancies noted at the time of receipt.

ORGANIC ANALYSES

Samples were analyzed for VOCs and TPH-G. Laboratory data were evaluated for the following parameters.

Preservation and Holding Times – Acceptable

Blanks – Acceptable

Surrogates – Acceptable

Laboratory Control Sample/Laboratory Control Sample Duplicates (LCS/LCSD) – Acceptable

Water BETX by EPA 8021: The LCSD sample malfunctioned at the laboratory. The LCS and MS/MSD were within the control limits; therefore, the laboratory did not reanalyze the LCSD. Sample results are not qualified.

Matrix Spike/Matrix Spike Duplicates (MS/MSD) – Acceptable

Reporting Limits – Acceptable

OVERALL ASSESSMENT OF DATA

The completeness of SDG IT11 is 100%. The usefulness of this data is based on EPA guidance documents listed in the introduction to this report. Few problems were identified and analytical

performance was generally within specified limits. The data are not qualified and meet the project's data quality objectives.

Sample ID	Qualified Analyte	Qualified Result	Qualifier Reason
FS-SB-PP154-0040	None		
FS-GW-PP154-0080	None		
FS-SB-PP156-0040	None		
FS-SB-PP156-1040	None		
FS-GW-PP156-0080	None		
FS-GW-PP156-1080	None		
FS-SB-PP155-0040	None		
FS-GW-PP155-0080	None		
FS-SB-PP157-0040	None		
FS-GW-PP157-0080	None		
FS-SB-PP158-0040	None		
FS-GW-PP158-0080	None		
FS-SB-PP159-0040	None		
FS-GW-PP159-0080	None		
Trip Blank	None		

Analytical Resources, Incorporated
Analytical Chemists and Consultants

November 21, 2005

Dave Haddock
GeoMatrix Consultants
One Union Square
600 University Street, Suite 1020
Seattle, WA 98101

RE: Project: Boeing Renton AOC-092 Investigation
ARI Job: IT11

Dear Mr. Haddock,

Please find enclosed the original chain of custody record and analytical results for the project referenced above. Analytical Resources, Inc. accepted seven water samples, seven soil samples and a trip blank in good condition on November 11, 2005. There were no discrepancies between the COC and the sample container labels.

The samples were analyzed for BETX referencing EPA 8021 and NWTPH-G as requested on the COC.

Please refer to the case narrative for anomalies associated with these samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

To the best of my knowledge, I certify these data are in compliance with all laboratory requirements of the QAPP for the Boeing Renton Facility dated 1997.

Sincerely,
ANALYTICAL RESOURCES, INC.

Mel D. Owe for

Stephanie Lucas
Project Manager
(206) 695-6213
steph@arilabs.com
www.arilabs.com

Enclosures

cc: File IT11

05-19368 to 05-19381

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: IT11	Turn-around Requested: Standard	Page: 1 of 2	
ARI Client Company: Geomatrix	Phone: 206-342-1787	Date: 11/11/05	Ice Present? Y
Client Contact: Dave Haddock		No. of Coolers: 2	Cooler Temps: 4.0, 6.0°
Client Project Name: Boeing Renton AOC-092 Investigation			
Client Project #: 8888	Samplers: Tasya Gray		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: BTEX	Analysis Requested: NWTPH-Gx	Notes/Comments
FS-SB-PP154-0040	11/11/05	0935	S	10	X	X	extra volume for MS/MSD
FS-GW-PP154-0080		1026	W	6	X	X	" "
FS-SB-PP156-0040		1050	S	4	X	X	
FS-SB-PP156-1040		1050	S	4	X	X	
FS-GW-PP156-0080		1117	W	2	X	X	
FS-GW-PP156-1080		1117	W	2	X	X	
FS-SB-PP155-0040		1138	S	4	X	X	
FS-GW-PP155-0080		1205	W	2	X	X	
FS-SB-PP157-0040		1250	S	4	X	X	
FS-GW-PP157-0080		1318	W	2	X	X	

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: TASYA GRAY	Printed Name: BOB CONGLETON	Printed Name:	Printed Name:
	Company: GEOMATRIX	Company: ARI	Company:	Company:
	Date & Time: 11/11/05 1528	Date & Time: 11/11/05 1528	Date & Time:	Date & Time:

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: FT11	Turn-around Requested: Standard	Page: 1 of 2	
ARI Client Company: Geomatrix Phone: 206-342-1787		Date: 11/11/05	Ice Present? Y
Client Contact: Dave Haddock		No. of Coolers: 2	Cooler Temps: 4.0, 6.0
Client Project Name: Boeing Renton AOC-192 Investigation			
Client Project #: 8888	Samplers: Tasya Gray		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: BTEX	Analysis Requested: NWTPH-Gx	Notes/Comments
FS-SB-PP158-0040	11/11/05	1332	S	4	X	X	
FS-GW-PP158-0080		1358	W	2	X	X	
FS-SB-PP159-0040		1411	S	3	X	X	
FS-GW-PP159-0080		1433	W	2	X	X	
Trip Blank			W	2	X		

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Tasya Gray	Printed Name: Bob Compton	Printed Name:	Printed Name:
	Company: Geomatrix	Company: ARI	Company:	Company:
	Date & Time: 11/11/05 1524	Date & Time: 11/11/05 1528	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

ANALYTICAL
RESOURCES
INCORPORATED

Case Narrative
Project: Boeing Renton AOC-092 Investigation
ARI Job: IT11
November 21, 2005

BETX by Method 8021/NWTPH-G

The water samples were received with a pH<2.0 and were analyzed on 11/15-16/05 within the recommended 14 day hold time. The soil samples were analyzed on 11/15/05 within the recommended 14 day hold time.

Samples: No anomalies were associated with these samples.

Method Blank(s): The method blanks were free of contamination.

Surrogates: All surrogate recoveries were in control.

MS/MSD(s): All percent recoveries and RPDs were in compliance.

LCS/LCSD(s): All percent recoveries and RPDs were in compliance except as follows. The LCSD associated with the water samples failed to inject. Since the percent recoveries for the LCS and the corresponding MS/MSD were within established control limits, no re-analysis or corrective actions were taken.

Data Reporting Qualifiers

Effective 12/28/04

Inorganic Data

U Indicates that the target analyte was not detected at the reported concentration

* Duplicate RPD is not within established control limits

B Reported value is less than the CRDL but ≥ the Reporting Limit

N Matrix Spike recovery not within established control limits

NA Not Applicable, analyte not spiked

H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U Indicates that the target analyte was not detected at the reported concentration

* Flagged value is not within established control limits

B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J Estimated concentration when the value is less than ARI's established reporting limits

D The spiked compound was not detected due to sample extract dilution

NR Spiked compound recovery is not reported due to chromatographic interference

E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

Geotechnical Data

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

F Samples were frozen prior to particle size determination

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-SB-PP154-0040
SAMPLE

Lab Sample ID: IT11A
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 16:03
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 72 mg-dry-wt
Percent Moisture: 19.0%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	18	< 18 U
108-88-3	Toluene	35	< 35 U
100-41-4	Ethylbenzene	35	< 35 U
	m,p-Xylene	70	< 70 U
95-47-6	o-Xylene	35	< 35 U
1330-20-7	Xylenes, Total	140	< 140 U

			GAS ID
	Gasoline Range Hydrocarbons	7.0	< 7.0 U ---

BETX Surrogate Recovery

Trifluorotoluene	104%
Bromobenzene	107%

Gasoline Surrogate Recovery

Trifluorotoluene	101%
Bromobenzene	109%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: FS-SB-PP156-0040
SAMPLE

Lab Sample ID: IT11B
LIMS ID: 05-19369
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 17:22
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 60 mg-dry-wt
Percent Moisture: 28.0%

CAS Number	Analyte	RL	Result	GAS ID
71-43-2	Benzene	21	< 21 U	
108-88-3	Toluene	42	< 42 U	
100-41-4	Ethylbenzene	42	< 42 U	
	m,p-Xylene	83	< 83 U	
95-47-6	o-Xylene	42	< 42 U	
1330-20-7	Xylenes, Total	170	< 170 U	
	Gasoline Range Hydrocarbons	8.3	< 8.3 U	---

BETX Surrogate Recovery

Trifluorotoluene	118%
Bromobenzene	118%

Gasoline Surrogate Recovery

Trifluorotoluene	114%
Bromobenzene	120%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-SB-PP156-1040
SAMPLE

Lab Sample ID: IT11C
LIMS ID: 05-19370
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 17:49
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 63 mg-dry-wt
Percent Moisture: 21.0%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	20	< 20 U
108-88-3	Toluene	40	< 40 U
100-41-4	Ethylbenzene	40	< 40 U
	m,p-Xylene	79	< 79 U
95-47-6	o-Xylene	40	< 40 U
1330-20-7	Xylenes, Total	160	< 160 U

			GAS ID
Gasoline Range Hydrocarbons	7.9	< 7.9 U	---

BETX Surrogate Recovery

Trifluorotoluene	107%
Bromobenzene	108%

Gasoline Surrogate Recovery

Trifluorotoluene	107%
Bromobenzene	108%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-SB-PP155-0040
SAMPLE

Lab Sample ID: IT11D
LIMS ID: 05-19371
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 19:34
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 73 mg-dry-wt
Percent Moisture: 20.5%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	17	< 17 U
108-88-3	Toluene	34	< 34 U
100-41-4	Ethylbenzene	34	< 34 U
	m,p-Xylene	68	< 68 U
95-47-6	o-Xylene	34	< 34 U
1330-20-7	Xylenes, Total	140	< 140 U

			GAS ID
Gasoline Range Hydrocarbons	6.8	< 6.8 U	---

BETX Surrogate Recovery

Trifluorotoluene	115%
Bromobenzene	116%

Gasoline Surrogate Recovery

Trifluorotoluene	109%
Bromobenzene	116%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: FS-SB-PP157-0040
SAMPLE

Lab Sample ID: IT11E
LIMS ID: 05-19372
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 20:00
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 62 mg-dry-wt
Percent Moisture: 23.4%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	20	< 20 U
108-88-3	Toluene	40	< 40 U
100-41-4	Ethylbenzene	40	< 40 U
	m,p-Xylene	80	< 80 U
95-47-6	o-Xylene	40	< 40 U
1330-20-7	Xylenes, Total	160	< 160 U

			GAS ID
	Gasoline Range Hydrocarbons	8.0	< 8.0 U ---

BETX Surrogate Recovery

Trifluorotoluene	109%
Bromobenzene	110%

Gasoline Surrogate Recovery

Trifluorotoluene	106%
Bromobenzene	112%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-SB-PP158-0040
SAMPLE

Lab Sample ID: IT11F
LIMS ID: 05-19373
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 20:26
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 87 mg-dry-wt
Percent Moisture: 11.2%

CAS Number	Analyte	RL	Result
71-43-2	Benzene	14	< 14 U
108-88-3	Toluene	29	< 29 U
100-41-4	Ethylbenzene	29	< 29 U
	m,p-Xylene	57	< 57 U
95-47-6	o-Xylene	29	< 29 U
1330-20-7	Xylenes, Total	110	< 110 U

			GAS ID
	Gasoline Range Hydrocarbons	5.7	< 5.7 U ---

BETX Surrogate Recovery

Trifluorotoluene	109%
Bromobenzene	110%

Gasoline Surrogate Recovery

Trifluorotoluene	105%
Bromobenzene	112%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-SB-PP159-0040
SAMPLE

Lab Sample ID: IT11G
LIMS ID: 05-19374
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 20:53
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 75 mg-dry-wt
Percent Moisture: 19.1%

CAS Number	Analyte	RL	Result	GAS ID
71-43-2	Benzene	17	< 17 U	
108-88-3	Toluene	34	< 34 U	
100-41-4	Ethylbenzene	34	< 34 U	
	m,p-Xylene	67	< 67 U	
95-47-6	o-Xylene	34	< 34 U	
1330-20-7	Xylenes, Total	130	< 130 U	
	Gasoline Range Hydrocarbons	6.7	< 6.7 U	---

BETX Surrogate Recovery

Trifluorotoluene	106%
Bromobenzene	108%

Gasoline Surrogate Recovery

Trifluorotoluene	101%
Bromobenzene	104%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TPHG by Method NWTPHG

Sample ID: FS-SB-PP154-0040
MATRIX SPIKE

Lab Sample ID: IT11A
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed MS: 11/15/05 16:30
MSD: 11/15/05 16:56
Instrument/Analyst MS: PID1/PKC
MSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount MS: 70 mg-dry-wt
MSD: 79 mg-dry-wt

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Gasoline Range Hydrocarbons	< 6.99 U	61.3	71.3	86.0%	52.6	63.4	83.0%	15.3%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

TPHG Surrogate Recovery

	MS	MSD
Trifluorotoluene	115%	131%
Bromobenzene	115%	117%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: FS-SB-PP154-0040
MATRIX SPIKE

Lab Sample ID: IT11A
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed MS: 11/15/05 16:30
MSD: 11/15/05 16:56
Instrument/Analyst MS: PID1/PKC
MSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount MS: 70 mg-dry-wt
MSD: 79 mg-dry-wt

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Benzene	< 17.5 U	429	542	79.2%	376	482	78.0%	13.2%
Toluene	< 34.9 U	2290	2520	90.9%	2020	2240	90.2%	12.5%
Ethylbenzene	< 34.9 U	602	799	75.3%	526	710	74.1%	13.5%
m,p-Xylene	< 69.9 U	2550	3090	82.5%	2230	2740	81.4%	13.4%
o-Xylene	< 34.9 U	993	1140	87.1%	866	1010	85.7%	13.7%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	MS	MSD
Trifluorotoluene	119%	112%
Bromobenzene	114%	109%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: MB-111505
METHOD BLANK

Lab Sample ID: MB-111505
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed: 11/15/05 13:09
Instrument/Analyst: PID1/PKC

Purge Volume: 5.0 mL
Sample Amount: 100 mg-dry-wt

CAS Number	Analyte	RL	Result
71-43-2	Benzene	12	< 12 U
108-88-3	Toluene	25	< 25 U
100-41-4	Ethylbenzene	25	< 25 U
	m,p-Xylene	50	< 50 U
95-47-6	o-Xylene	25	< 25 U
1330-20-7	Xylenes, Total	100	< 100 U

			GAS ID
Gasoline Range Hydrocarbons	5.0	< 5.0 U	---

BETX Surrogate Recovery

Trifluorotoluene	106%
Bromobenzene	106%

Gasoline Surrogate Recovery

Trifluorotoluene	99.9%
Bromobenzene	98.6%

BETX values reported in µg/kg (ppb)
Gasoline values reported in mg/kg (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TPHG by Method NWTPHG

Sample ID: LCS-111505
LAB CONTROL SAMPLE

Lab Sample ID: LCS-111505
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 11/15/05 13:35
LCSD: 11/15/05 14:01
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Gasoline Range Hydrocarbons	51.0	50.0	102%	52.5	50.0	105%	2.9%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

TPHG Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	110%	110%
Bromobenzene	107%	106%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-111505
LAB CONTROL SAMPLE

Lab Sample ID: LCS-111505
LIMS ID: 05-19368
Matrix: Soil
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 11/15/05 13:35
LCSD: 11/15/05 14:01
Instrument/Analyst LCS: PID1/PKC
LCSD: PID1/PKC

Purge Volume: 5.0 mL

Sample Amount LCS: 100 mg-dry-wt
LCSD: 100 mg-dry-wt

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Benzene	346	380	91.1%	351	380	92.4%	1.4%
Toluene	1850	1760	105%	1860	1760	106%	0.5%
Ethylbenzene	486	560	86.8%	494	560	88.2%	1.6%
m,p-Xylene	2020	2160	93.5%	2050	2160	94.9%	1.5%
o-Xylene	790	800	98.8%	804	800	100%	1.8%

Reported in µg/kg (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	LCS	LCSD
Trifluorotoluene	108%	109%
Bromobenzene	106%	107%

ANALYTICAL RESOURCES INCORPORATED

BETX SOIL SURROGATE RECOVERY SUMMARY

ARI Job: IT11
Matrix: Soil

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation

Client ID		TFT	BBZ	TOT OUT
MB-111505		106%	106%	0
LCS-111505		108%	106%	0
LCSD-111505		109%	107%	0
FS-SB-PP154-0040		104%	107%	0
FS-SB-PP154-0040	MS	119%	114%	0
FS-SB-PP154-0040	MSD	112%	109%	0
FS-SB-PP156-0040		118%	118%	0
FS-SB-PP156-1040		107%	108%	0
FS-SB-PP155-0040		115%	116%	0
FS-SB-PP157-0040		109%	110%	0
FS-SB-PP158-0040		109%	110%	0
FS-SB-PP159-0040		106%	108%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(83-131)	(57-150)
(BBZ) = Bromobenzene	(87-118)	(56-156)

Log Number Range: 05-19368 to 05-19374

ANALYTICAL RESOURCES INCORPORATED

TPHG SOIL SURROGATE RECOVERY SUMMARY

ARI Job: IT11
Matrix: Soil

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation

Client ID	TFT	BBZ	TOT OUT
MB-111505	99.9%	98.6%	0
LCS-111505	110%	107%	0
LCSD-111505	110%	106%	0
FS-SB-PP154-0040	101%	109%	0
FS-SB-PP154-0040 MS	115%	115%	0
FS-SB-PP154-0040 MSD	131%	117%	0
FS-SB-PP156-0040	114%	120%	0
FS-SB-PP156-1040	107%	108%	0
FS-SB-PP155-0040	109%	116%	0
FS-SB-PP157-0040	106%	112%	0
FS-SB-PP158-0040	105%	112%	0
FS-SB-PP159-0040	101%	104%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(80-128)	(55-165)
(BBZ) = Bromobenzene	(80-123)	(48-169)

Log Number Range: 05-19368 to 05-19374

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP154-0080
SAMPLE

Lab Sample ID: IT11H
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 20:40
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result	
71-43-2	**Benzene**	**1.0**	**5.9**	
108-88-3	Toluene	1.0	< 1.0	U
100-41-4	Ethylbenzene	1.0	< 1.0	U
	m,p-Xylene	**1.0**	**1.4**	
95-47-6	o-Xylene	1.0	< 1.0	U
1330-20-7	Xylenes, Total	2.0	< 2.0	U
	Gasoline Range Hydrocarbons	0.25	0.27	GAS ID: GAS

BETX Surrogate Recovery

Trifluorotoluene	101%
Bromobenzene	101%

Gasoline Surrogate Recovery

Trifluorotoluene	114%
Bromobenzene	112%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: FS-GW-PP156-0080
SAMPLE

Lab Sample ID: IT11I
LIMS ID: 05-19376
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 23:36
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	**Benzene**	1.0	**2.1**
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	94.9%
Bromobenzene	106%

Gasoline Surrogate Recovery

Trifluorotoluene	113%
Bromobenzene	107%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP156-1080
SAMPLE

Lab Sample ID: IT11J
LIMS ID: 05-19377
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/16/05 00:05
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	**Benzene**	**1.0**	**2.1**
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	97.9%
Bromobenzene	104%

Gasoline Surrogate Recovery

Trifluorotoluene	113%
Bromobenzene	104%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP155-0080
SAMPLE

Lab Sample ID: IT11K
LIMS ID: 05-19378
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/16/05 00:35
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result	
71-43-2	Benzene	1.0	< 1.0 U	
108-88-3	**Toluene**	**1.0**	**1.1**	
100-41-4	Ethylbenzene	1.0	< 1.0 U	
	m,p-Xylene	**1.0**	**2.0**	
95-47-6	o-Xylene	1.0	< 1.0 U	
1330-20-7	Xylenes, Total	2.0	< 2.0 U	
	Gasoline Range Hydrocarbons	**0.25**	**0.35**	**GAS**

GAS ID

BETX Surrogate Recovery

Trifluorotoluene	106%
Bromobenzene	106%

Gasoline Surrogate Recovery

Trifluorotoluene	117%
Bromobenzene	108%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: FS-GW-PP157-0080
SAMPLE

Lab Sample ID: IT11L
LIMS ID: 05-19379
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/16/05 01:04
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	**Benzene**	1.0	1.4
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	95.4%
Bromobenzene	104%

Gasoline Surrogate Recovery

Trifluorotoluene	107%
Bromobenzene	99.8%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP158-0080
SAMPLE

Lab Sample ID: IT11M
LIMS ID: 05-19380
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/16/05 01:33
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	**Benzene**	**1.0**	**2.0**
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	96.2%
Bromobenzene	104%

Gasoline Surrogate Recovery

Trifluorotoluene	107%
Bromobenzene	106%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP159-0080
SAMPLE

Lab Sample ID: IT11N
LIMS ID: 05-19381
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed: 11/16/05 02:02
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	95.7%
Bromobenzene	104%

Gasoline Surrogate Recovery

Trifluorotoluene	104%
Bromobenzene	105%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: Trip Blank
SAMPLE

Lab Sample ID: IT11O
LIMS ID: 05-19382
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/08/05
Date Received: 11/11/05

Date Analyzed: 11/15/05 18:43
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	98.2%
Bromobenzene	99.1%

Gasoline Surrogate Recovery

Trifluorotoluene	108%
Bromobenzene	100%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG

Sample ID: MB-111505
METHOD BLANK

Lab Sample ID: MB-111505
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed: 11/15/05 17:15
Instrument/Analyst: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor: 1.00

CAS Number	Analyte	RL	Result
71-43-2	Benzene	1.0	< 1.0 U
108-88-3	Toluene	1.0	< 1.0 U
100-41-4	Ethylbenzene	1.0	< 1.0 U
	m,p-Xylene	1.0	< 1.0 U
95-47-6	o-Xylene	1.0	< 1.0 U
1330-20-7	Xylenes, Total	2.0	< 2.0 U

			GAS ID
Gasoline Range Hydrocarbons	0.25	< 0.25 U	---

BETX Surrogate Recovery

Trifluorotoluene	102%
Bromobenzene	98.7%

Gasoline Surrogate Recovery

Trifluorotoluene	104%
Bromobenzene	102%

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

Sample ID: FS-GW-PP154-0080
MATRIX SPIKE

Lab Sample ID: IT11H
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed MS: 11/15/05 21:10
MSD: 11/15/05 23:07
Instrument/Analyst MS: PID2/PKC
MSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor MS: 1.0 mL
MSD: 1.0 mL

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Benzene	5.92	14.5	7.60	113%	13.6	7.60	101%	6.4%
Toluene	< 1.00 U	41.2	35.3	117%	38.4	35.3	109%	7.0%
Ethylbenzene	< 1.00 U	11.4	11.2	102%	11.0	11.2	98.2%	3.6%
m,p-Xylene	1.41	42.0	43.3	93.7%	41.2	43.3	91.9%	1.9%
o-Xylene	< 1.00 U	15.7	16.0	98.1%	15.8	16.0	98.8%	0.6%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

BETX Surrogate Recovery

	MS	MSD
Trifluorotoluene	123%	114%
Bromobenzene	106%	108%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: FS-GW-PP154-0080
MATRIX SPIKE

Lab Sample ID: IT11H
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: 11/11/05
Date Received: 11/11/05

Date Analyzed MS: 11/15/05 21:10
MSD: 11/15/05 23:07
Instrument/Analyst MS: PID2/PKC
MSD: PID2/PKC

Purge Volume: 5.0 mL

Dilution Factor MS: 1.0 mL
MSD: 1.0 mL

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Gasoline Range Hydrocarbons	0.27	1.17	1.00	90.0%	1.16	1.00	89.0%	0.9%

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

TPHG Surrogate Recovery

	MS	MSD
Trifluorotoluene	123%	121%
Bromobenzene	116%	115%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TPHG by Method NWTPHG
Page 1 of 1

Sample ID: LCS-111505
LAB CONTROL SAMPLE

Lab Sample ID: LCS-111505
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 11/15/05 17:45
Instrument/Analyst LCS: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor LCS: 1.0 mL

Analyte	LCS	Spike Added	Recovery
Gasoline Range Hydrocarbons	0.87	1.00	87.0%

Reported in µg/L (ppb)

TPHG Surrogate Recovery

Trifluorotoluene	116%
Bromobenzene	112%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
Page 1 of 1

Sample ID: LCS-111505
LAB CONTROL SAMPLE

Lab Sample ID: LCS-111505
LIMS ID: 05-19375
Matrix: Water
Data Release Authorized:
Reported: 11/18/05

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 11/15/05 17:45
Instrument/Analyst LCS: PID2/PKC

Purge Volume: 5.0 mL
Dilution Factor LCS: 1.0 mL

Analyte	LCS	Spike Added	Recovery
Benzene	7.51	7.60	98.8%
Toluene	35.0	35.3	99.2%
Ethylbenzene	10.1	11.2	90.2%
m,p-Xylene	38.0	43.3	87.8%
o-Xylene	14.5	16.0	90.6%

Reported in µg/L (ppb)

BETX Surrogate Recovery

Trifluorotoluene	111%
Bromobenzene	104%

ANALYTICAL RESOURCES INCORPORATED

BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: IT11
Matrix: Water

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation

Client ID		TFT	BBZ	TOT OUT
MB-111505		102%	98.7%	0
LCS-111505		111%	104%	0
FS-GW-PP154-0080		101%	101%	0
FS-GW-PP154-0080	MS	123%	106%	0
FS-GW-PP154-0080	MSD	114%	108%	0
FS-GW-PP156-0080		94.9%	106%	0
FS-GW-PP156-1080		97.9%	104%	0
FS-GW-PP155-0080		106%	106%	0
FS-GW-PP157-0080		95.4%	104%	0
FS-GW-PP158-0080		96.2%	104%	0
FS-GW-PP159-0080		95.7%	104%	0
Trip Blank		98.2%	99.1%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(78-129)	(52-132)
(BBZ) = Bromobenzene	(83-119)	(63-127)

Log Number Range: 05-19375 to 05-19382

ANALYTICAL RESOURCES INCORPORATED

TPHG WATER SURROGATE RECOVERY SUMMARY

ARI Job: IT11
Matrix: Water

QC Report No: IT11-The Boeing Company
Project: 8888
Event: Boeing Renton AOC-092 Investigation

Client ID	TFT	BBZ	TOT OUT
MB-111505	104%	102%	0
LCS-111505	116%	112%	0
FS-GW-PP154-0080	114%	112%	0
FS-GW-PP154-0080 MS	123%	116%	0
FS-GW-PP154-0080 MSD	121%	115%	0
FS-GW-PP156-0080	113%	107%	0
FS-GW-PP156-1080	113%	104%	0
FS-GW-PP155-0080	117%	108%	0
FS-GW-PP157-0080	107%	99.8%	0
FS-GW-PP158-0080	107%	106%	0
FS-GW-PP159-0080	104%	105%	0
Trip Blank	108%	100%	0

	LCS/MB LIMITS	QC LIMITS
(TFT) = Trifluorotoluene	(79-124)	(53-133)
(BBZ) = Bromobenzene	(78-119)	(56-132)

Log Number Range: 05-19375 to 05-19382